5-503.23 1537

Department of Energy

Ohio Field Office
Fernald Area Office
P. O. Box 538705
Cincinnati, Ohio 45253-8705
(513) 648-3155

JUN 25 1998

DOE-0923-98

Mr. James A. Saric, Remedial Project Manager
U.S. Environmental Protection Agency
Region V-SRF-5J
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

Mr. Tom Schneider, Project Manager
Ohio Environmental Protection Agency
401 East 5th Street
Dayton, Ohio 45402-2911

Dear Mr. Saric and Mr. Schneider:

TRANSMITTAL: (1) DRAFT RESPONSES TO THE U.S. ENVIRONMENTAL PROTECTION AGENCY COMMENTS ON THE IN-SITU GAMMA SPECTROMETRY ADDENDUM TO THE SITE-WIDE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT QUALITY ASSURANCE PROJECT PLAN AND (2) DRAFT PROJECT SPECIFIC PLAN FOR EXCAVATION CHARACTERIZATION DURING THE PERFORMANCE OF EXCAVATION IN THE OPERABLE UNIT 2 SOUTHERN WASTE UNITS.

The purpose of this letter is to transmit, for your review and approval, three items: (1) draft responses to the U.S. Environmental Protection Agency (U.S. EPA) comments on the In-Situ Gamma Spectrometry Addendum to the Sitewide Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Quality Assurance Project Plan (SCQ); (2) revised Appendix H to the In-Situ Gamma Spectrometry Addendum; and (3) revised draft Project Specific Plan (PSP) for Excavation Characterization during the Performance of Excavation in the Operable Unit 2 (OU2) Southern Waste Units (SWU), also known as Area 2, Phase I (A2PI).

The draft responses and the revised Appendix H of the In-Situ Gamma Spectrometry Addendum to the SCQ were submitted via electronic mail on Thursday, June 18, 1998; while the draft PSP was submitted to the U.S. EPA and Ohio Environmental Protection Agency (OEPA) by overnight mail on Friday, June 19, 1998. Additionally, a conference call was held on Monday, June 22, 1998, to discuss these documents and any

outstanding issues associated with the initiation of excavation activities in A2PI. Susequent to the conference call a conditional approval, with comments, was provided on the draft PSP by the OEPA. The enclosed revised PSP addresses the comments received from the OEPA.

If you should have any questions, please contact Robert Janke at (513) 648-3124.

Sincerely,

Johnny W. Reising
Fernald Remedial Action
Project Manager

FEMP:R.J. Janke

Enclosures: As Stated

cc w/encs:

K. Miller, DOE-EML
G. Jablonowski, USEPA-V, SRF-5J
R. Beaumier, TPSS/DERR, OEPA-Columbus
T. Schneider, OEPA-Dayton (total of 3 copies of enc.)
M. Davis, ANL
F. Bell, ATSDR
M. Schupe, HSI GeoTrans
R. Vandegrift, ODH
F. Barker, Tetra Tech
D. Carr, FDF/52-2
J. D. Chiou, FDF/52-5
T. Hagen, FDF/65-2
J. Harmon, FDF/90
AR Coordinator, FDF/78

cc w/o encs:

N. Hallein, EM-42/CLOV
A. Tanner, DOE-FEMP
R. Heck, FDF/2
S. Hinnefeld, FDF/2
EDC, FDF/52-7

2

RESPONSES TO U.S. EPA TECHNICAL REVIEW COMMENTS ON "IN-SITU GAMMA SPECTROMETRY ADDENDUM TO THE SITEWIDE CERCLA QUALITY ASSURANCE PROJECT PLAN"

COMMENTS ON "SCQ APPENDIX H"

Commenting Organization: U.S. EPA — Commentor: Saric
Section #: H.1 — Page #: 2 — Line #: NA
Original Specific Comment #: 1

Comment: This section refers to use of the high-purity germanium (HPGe) system "in certification and pre-certification characterization activities." The words "certification and" should be deleted. Another sentence may be added to state that the use of the HPGe system in certification activities is under consideration and will require regulatory agency approval before it can be implemented.

Response: Agree with comment.

Action: The words "certification and" will be deleted from the sentence that reads: "This characteristic permits the HPGe to be used in certification and pre-certification activities." At the end of this sentence, the following sentence will be added: "Use of the HPGe system in certification activities is under consideration and will require regulatory agency approval before it can be implemented." Note: See attached correction in the draft revision of Appendix H.

Commenting Organization: U.S. EPA — Commentor: Saric
Table # : 2 — Page #: 5 to 7 — Line #: NA
Original Specific Comment #: 2

Comment: The quality control (QC) requirements for precision associated with use of the HPGe system that are presented in this table are not fully consistent with those presented in other documents. This table should be revised to include a QC element for the Field Control Station for measurement of total uranium, thorium-232, radium-226, and potassium-40 similar to that presented in Appendix F of the "Sitewide CERCLA Quality Assurance Project Plan" (SCQ).

Response: Agree with comment. Apparently, the QC requirement referred to in the comment got "dropped" in the page break when Table 2 was printed out. It was included in Table 2 originally. Note that in the attached copy of Table 2, this QC requirement is included. Note also that Appendix F in the comment above refers to the Appendix in the Real Time Instrumentation Measurement Program Quality Assurance Plan, not the SCQ.

Action: Ensure that the QC element relative to the measurement of total uranium, thorium-232, radium-226, and potassium-40 does not get dropped from the final version of Table 2 in Appendix H of the SCQ addendum.

Commenting Organization: U.S. EPA Commentor: Saric
Table #: 2 Page #: 6 Line #: NA
Original Specific Comment #: 3
Comment: The QC acceptance criterion listed for precision of duplicates when the measured value is less than five times the minimum detectable concentration (MDC) is not consistent with information in the "In-Situ Gamma Spectrometry Quality Control Measurements" document or with standard data validation procedures. This criterion should be revised to "measurement difference ≤ ± MDC" as shown in both Table 8 (Page 19) and Attachment A (Page 31) of the QC measurements document.

Response: Agree with comment.

Action: Table 2 will be revised so that the precision of duplicates criterion reads "measured value < (5xMDC) then measurement difference ≤ ± MDC." Note correction in Attached Table 2.

COMMENTS ON "REAL TIME INSTRUMENTATION MEASUREMENT PROGRAM QUALITY ASSURANCE PLAN"

Commenting Organization: U.S. EPA Commentor: Saric
Appendix #: A Page #: 28 Line #: NA
Original Specific Comment #: 4
Comment: The reference list includes use of a field instrument for detection of low-energy radiation (FIDLER) as Procedure EQT-36. However, review of the quality assurance (QA) plan did not reveal what role this procedure serves. Additional information should be provided in the QA plan to explain the QA application of the FIDLER.

Response: Currently, there are no plans to use a FIDLER in remediation operations. Therefore, Procedure EQT-36 will be deleted from the reference list (Appendix A) of the Real Time Instrumentation Measurement Program Quality Assurance Plan.

Action: Procedure EQT-36 will be deleted from the reference list in Appendix A of the Real Time Instrumentation Measurement Program Quality Assurance Plan.

Commenting Organization: U.S. EPA Commentor: Saric
Appendix #: F Page #: 41 Line #: NA
Original Specific Comment #: 5
Comment: This appendix repeats the information in Table 2 of "SCQ Appendix H." Therefore, Original Specific Comment 3 on the QC acceptance criterion for precision of duplicates also applies to Appendix F and should be addressed.

Response: Agree with comment.

Action: Appendix F of the Real Time Instrumentation Measurement Program Quality Assurance Plan will be revised so that the precision of duplicates criterion reads "measured value < (5xMDC) then measurement difference ≤ ± MDC."

COMMENTS ON "IN-SITU GAMMA SPECTROMETRY QUALITY CONTROL MEASUREMENTS"

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 6.3 Page #: 9 and 10 Line #: NA
Original Specific Comment #: 6

Comment: This section presents the pre-operational energy calibration procedure for the radiological scanning system that is still under development. Because this system, like the HPGe system, depends on battery power for operation, a post-operational check should be added to ensure that the quality of the measurements made has not been impaired by battery depletion during system operation. Use of the thorium source to repeat the pre-operational check based on the criteria in Table 2 should serve as an appropriate post-operational check. Although such a post-operational check is not required for the radiation tracking system, which uses a portable generator for power, consideration should be given to including a similar verification check in Section 6.4.

Response: When the Radiological Scanning System (RSS) is placed into service, post-operational checks, similar to pre-operational checks, will be performed. Post-operational detector response checks for RTRAK will be initiated. Sections 6.3 and 6.4 of Procedure ADM-16 will be amended accordingly.

Action: Revise Sections 6.3 and 6.4 of Procedure ADM-16 to include post-operational RSS and RTRAK checks.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 6.11 Page #: 25 Line #: NA
Original Specific Comment #: 7

Comment: Although not directly related to QC for in situ measurements, a data review for any discrepancies between gamma energies that might indicate a source at depth of shine should be considered for incorporation in Section 6.11.

Response: A procedure, ADM-17, tentatively entitled "Review and Reporting of In-Situ Gamma Spectrometry Data" is in the process of being written. It will include a data review for any discrepancies between gamma photon energies that might indicate either a gamma source at depth or shine. Section 6.11 of Procedure ADM-16 will be revised to include a cross-reference to this procedure once the procedure has been approved and becomes effective.

Action: Revise Section 6.11 of Procedure ADM-16 to include a cross-reference to Procedure ADM-17 on data review and reporting once the latter procedure has been approved and becomes effective.

Commenting Organization: U.S. EPA | Commentor: Saric
Section #: 9.0 | Page #: 27 | Line #: NA
Original Specific Comment #: 8

Comment: The reference list includes American Society for Testing and Materials (ASTM) Method D 3856-88. This edition of the method is obsolete and has been replaced by Method D 3856-95. All ASTM methods must be reapproved or modified at intervals not exceeding 7 years; the other two ASTM methods cited in this section were reapproved with no significant changes in 1997. The Method D 3856-88 reference should be revised either to reflect the current edition of the method or to state only the method number (D 3856) with a note that the current edition should be used.

Response: Agree with comment.

Action: All ASTM methods referenced in Section 9.0 of Procedure ADM-16 will only list the method number (D 3856, for example). In parentheses following the method number will be the phrase "current version."

DRAFT REVISION OF APPENDIX H

IN-SITU GAMMA SPECTROMETRY QA/QC PROGRAM

TABLE OF CONTENTS

APPENDIX H

IN-SITU GAMMA SPECTROMETRY QA/QC PROGRAM

H.1 INTRODUCTION

Two systems, the HPGe (high purity germanium detector) and the RTRAK (Radiation Tracking System), perform in-situ gamma spectrometry measurements to provide data on the concentrations of primary radiological contaminants of concern in surface (or exposed) soil at the FEMP.

The RTRAK system is a gamma-ray measurement system mounted on a tractor. The measurement system consists of a 4x4x16 (inches) NaI detector and associated electronics that provide high-speed pulse height analysis. This system allows the collection of a gamma energy spectrum, which can be analyzed to identify and quantify radioactive isotopes that may be present within the detector's viewing area. Gross gamma activity data may also be obtained, depending upon data usage requirements. The tractor is equipped with a global positioning system (GPS), operating in a real-time differential mode to provide location coordinates. Each energy spectrum is tagged with the location coordinates provided by the GPS. All energy and location data are stored on magnetic media by an on-board computer system. This information is used to accurately locate and subsequently map radiological data within the measurement area. A future version of the RTRAK, called RSS for Radiation Scanning System, will consist of a 4x4x16 (inches) NaI detector mounted on a three-wheeled, pushed vehicle to be used in areas that are inaccessible to the tractor-mounted system. This system will also contain the same type of GPS and electronics systems as the tractor version.

The HPGe system is also a gamma spectrometry system which is functionally identical to the RTRAK system. Gamma rays are detected by the HPGe crystal mounted on a tripod; but the detector output signals are processed by the same type of pulse amplification and pulse height analysis electronics employed in the RTRAK system. For each system, the output is a gamma ray spectrum which consists of a count of the number of gamma photons detected as a function of the photon energy. Peaks in these spectra occur at energies which are characteristic of the radionuclides present in the soil and other surroundings. The area under a given peak is directly proportional to the amount of that radionuclide present. Thus, both systems can identify which particular radionuclides are present in the soil as well as the amount of each that is present. One of the principal advantages of the HPGe system is its superior resolution. A high purity germanium detector will typically have a resolution (peak full width at half the maximum peak height) of 2 to 3 keV, whereas a NaI detector will have a resolution of 40 to 60 keV. In simple terms, the peaks in a NaI spectrum are much broader than those in a HPGe spectrum. This means that two or more characteristic gamma emissions which have energies that are less than about 60 keV apart will appear as one broad peak in a NaI spectrum, thereby making accurate quantification of each radionuclide very difficult. However, HPGe detectors can easily resolve gamma emissions which are only 2 or 3 keV apart. The superior resolution of the HPGe detector makes it possible to analyze more complex gamma ray spectra. This means that it is easier to identify situations in which there may be gamma rays of nearly identical energy interfering with one another. Further, one can also analyze materials with HPGe containing many different gamma emitters. Fortunately, the variety of radionuclides

typically found in FEMP soils is small enough that accurate quantitative information may be obtained with both NaI and HPGe detectors.

The RTRAK and HPGe systems complement each other. The RTRAK is able to provide rapid, 100% coverage of an area. Its precision and detection limits are sufficient to determine the general patterns of contamination within a given area with respect to total uranium, thorium-232 and radium-226. Its data output is amenable to mapping and spatial averaging. The latter attribute makes RTRAK very useful for determining the average concentrations of soil contaminants. Finally, the RTRAK is ideal as a front-end survey tool to help focus and guide the use of HPGe. RTRAK measurements are made at ASL A data quality levels.

The high degree of resolution produced by the HPGe detectors permits the identification and quantification of specific isotopes. These characteristics enable the HPGe to provide high quality data that support the characterization and remediation of surface soils. With the detector lowered, the HPGe is able to focus on small areas and delineate hot spots that potentially exceed the waste acceptance criterion(WAC) or final remediation levels(FRLs). With the detector raised, the HPGe has a wide field of view that enables it to average data over a larger area, thereby maximizing data representativeness and minimizing heterogeneity effects associated with sampling discrete points. This characteristic permits the HPGe to be used in pre-certification characterization activities. Use of the HPGe system in certification activities is under consideration and will require regulatory approval before it can be implemented.

H.2 QA AND QC PROGRAMS

The in-situ gamma spectrometry QA and QC programs at the FEMP are described in two formal documents. Plan number 20300-PL-002, entitled "Real Time Instrumentation Measurement Program Quality Assurance Plan," presents a comprehensive approach for the in-situ gamma spectrometry QA program. The QA plan delineates how quality will be maintained by implementing both the requirements of the Fluor Daniel Quality Assurance Program, RM-0012 (referred to hereafter as RM-0012), and the SCQ. The plan covers the elements needed for a program that produces environmental data which are accurate, precise, complete, representative, comparable, and legally defensible for the data's intended usage.

The QC procedure (ADM-16, entitled "In-Situ Gamma Spectrometry Quality Control Measurements") provides instruction for the collection and evaluation of specified QC measurements utilizing in-situ gamma spectrometry measurement equipment at the FEMP. Additionally, this procedure establishes a process for preparing and generating QC charts for in-situ gamma spectrometry, a chain of custody process for tracking computer data disk transfers, and a process for initiation of a nonconformance report when quality deficiencies are noted.

Both the QA plan and the QC procedure are stand-alone addenda to the SCQ. This allows both documents to be revised and reviewed independently of the remainder of the SCQ and vice versa. The intent is that when the in-situ gamma spectrometry program has matured such that revisions to the QA plan and QC procedure are infrequent, the necessity of

having those two documents as stand-alone addenda will be obviated, and they will be merged into the SCQ proper.

H.3 CROSSWALK BETWEEN THE REAL TIME INSTRUMENTATION MEASUREMENT PROGRAM QA PLAN AND THE SCQ

Table 1 provides a correlation of specific program QA elements as they are found in the following documents: RM-0012, the Real Time Instrumentation Measurement Program QA Plan, and the SCQ. The elements of the Real Time Instrumentation Measurement Program (RTIMP) QA Plan are cross-walked to the corresponding elements of the other documents.

TABLE 1
CROSSWALK BETWEEN RTIMP QA PLAN, RM-0012 AND THE SCQ

ELEMENT	RTIMP QA Plan Section	RM-0012 Criterion	SCQ Section
Program	1.0	1	2.0, 12.4.6
Personnel Training/ Qualification	2.0	2	4.4.1
Quality Improvement	3.0	3	15
Documents and Records	4.0	4	4.4.2, 4.4.3, 7.3
Work Processes	5.0	5	9, 10, 11
Method Design	6.0	6	N/A
Procurement/Control of Materials and Services	7.0	7	3
Facilities/Equipment/ Calibration/Maintenance	8.0	8	8, 13
Management Assessment	9.0	9	16
Lab Assessments/Audits	10.0	10	12

H.4 ELEMENTS OF IN-SITU GAMMA SPECTROMETRY QC MEASUREMENTS PROCEDURE

This procedure applies to quality control activities conducted by FEMP personnel when carrying out in-situ gamma spectrometry measurements. QC activities covered by this procedure include:

//

1. RTRAK energy calibration
2. HPGe operational performance checks
   - HPGe pre-operational energy calibration
   - Field QC Station measurements
   - Field measurement interference check
   - HPGe post-operational energy check
3. Minimum detectable concentrations
4. Precision of duplicate HPGe measurements
5. HPGe performance criteria
6. HPGe detector counting efficiency determination
7. Control chart preparation and maintenance
8. Data review and approval
9. Initiating nonconformance reports

Attachment A in the QC procedure tabulates and summarizes all quality control parameters, their acceptance criteria, and the frequency with which they must be checked. This attachment is reproduced below as Table 2.

TABLE 2
TABULATION OF QC CRITERIA AND REQUIREMENTS

RTRAK and RSS Detector QC Criteria and Requirements					
QC Element	**Nuclide**	**Gamma Energy**	**QC Criteria**	**Frequency**	**Control Chart**
Energy Calibration	Tl-208 Pb-212	2614.5 keV 238.6 keV	Channel 447 ± 2 Channel 40 ± 2	Days used prior to use	No
HPGe Detector QC Criteria and Requirements					
QC Element	**Nuclide**	**Gamma Energy**	**QC Criteria**	**Frequency**	**Control Chart**
Energy Calibration	Am-241 Cs-137 Co-60	59.5 keV 661.6 keV 1332.5 keV	Channel 158 ± 1 Channel 1763 ± 2 Channel 3553 ± 2	Days used prior to use	No
Detector Resolution	Co-60	1332.5	Measured mean value $\bar{x} \pm 3\sigma$	Days used prior to use	Yes
Detector Counting Efficiency Check	Co-60	1332.5	Pre-determined check source value (decay corrected) $\bar{x} \pm 3\sigma$	Days used prior to use	Yes

TABLE 2
TABULATION OF QC CRITERIA AND REQUIREMENTS
(continued)

HPGe Field Measurements QC Criteria and Requirements				
QC Element	**Gamma Energy Nuclide or Basis**	**QC Acceptance Criteria**	**Frequency**	**Control Chart**
Field Measurement Interference	1460.8 keV	keV = 1460.8 FWHM = ± 3.0 keV or Channel = 3895.0 FWHM = ± 8 Channels	Each time measurements are made	No
Field Control Station	Total U Th-232 Ra-226 K-40	ASL D measured value ±3σ measured value ±3σ measured value ±3σ measured value ±3σ	Each day measurements are made	Yes
Field Control Station	Temperature Humidity Soil Moisture	No Criteria	Each day measurements are made	No
Minimum Detectable Concentration	Free Release Levels for Nuclides of Concern	for ASL D 95% UCL[1] < FRLs for ASL B 90% UCL[1] < FRLs	Quarterly	No
Measurement Accuracy (Total U, Th-232, Ra-226)	Compared to weighted average of physical samples	ASL D weighted average of physical sample ± 20% ASL B weighted average of physical sample ± 35%	Annually	No
Measurement Bias	Compared to weighted average of physical samples	Bias acceptable unless it produces errors resulting in accuracy being exceeded	Annually	No
Precision of Duplicates	At least one per 20 HPGe measurements	measured value >(5xMDC) then RPD ≤ ±20% measured value <(5xMDC) then measurement difference ≤ ±MDC	At least one per 20 HPGe measurements	No

TABLE 2
TABULATION OF QC CRITERIA AND REQUIREMENTS
(continued)

HPGe Field Measurements QC Criteria and Requirements				
QC Element	**Gamma Energy Nuclide or Basis**	**QC Acceptance Criteria**	**Frequency**	**Control Chart**
Detector Counting Efficiency Determination	Determination of conversion (efficiency) factors	Initial conversion factor ± 10% for each gamma energy[2]	Annually	No

Notes: [1] The upper confidence level (UCL) for the MDC
[2] Nuclide and Gamma Energies measured:

Cs-137	32.2
Eu-152	39.5
Am-241	59.5
Eu-152	121.8
Eu-152	244.7
Eu-152	344.3
Eu-152	411.1
Eu-152	444.0
Cs-137	661.6
Eu-152	778.9
Eu-152	964.0
Co-60	1173.7
Co-60	1332.5
Eu-152	1408.0